AMENDMENTS TO THE SPECIFICATION

Please replace the title with the following rewritten title:

-- APPARATUS FOR DETERMINING PAST-SERVICE CONDITIONS AND REMAINING LIFE OF THERMAL BARRIER COATINGS AND COMPONENTS HAVING SUCH COATINGS. --

Please replace Paragraph 0028 with the following rewritten paragraph:

-- In another embodiment of the present invention, more than one type of activator ions may be incorporated in the photoluminescent host material in the TBC, each type of activator ions being incorporated in a fraction of the thickness of the TBC and each being capable of giving a distinct emission characteristic. As the engine component is exposed to elevated temperature during use, a first type of activator ions can emit a spectrum with a first characteristic that varies with the service time at the elevated temperatures. If the TBC is eroded, for example, because of spallation of an outer portion of the TBC, a second type of activator ions incorporated in a deeper layer of the TBC becomes exposed to excitation radiation and emits a spectrum with a second characteristic. Such a manifestation of difference in spectrum characteristics can provide a measure of an erosion of the TBC and, thus, an estimate of the protection that the remaining potion of the TBC can afford and of the remaining useful life of the TBC and the engine component. In addition, the spectrum having a second characteristic of the second type of activator ions can provide the historical service condition of that portion of the TBC wherein the activator ions of the second type reside. For example, as the engine component is put in service, there is a gradient in the average temperature across the thickness of the TBC. This gradient in average temperature can result in a gradient in the amount of the monoclinic phase across the thickness of the TBC. Therefore, a new peak in the emission spectrum of the second type of activator ions can provide information on this amount of the monoclinic phase in the intermediate portion of the TBC that is exposed after an erosion of the outer portion. The historical service condition, such as the average temperature experienced by the intermediate portion of the TBC can also be determined from such an emission spectrum of the second type of activator ions even in the case in which an erosion of the outer portion of the TBC has not completely or substantially occurred if light pipes have been formed or

constructed into the TBC and penetrate the same. In such a case, exciting radiation can be provided to and emitted radiation can be obtained from a deeper portion of the TBC. --

Please replace Paragraph 0030 with the following rewritten paragraph:

-- The TBC of an engine component used in the method of the present invention comprises zirconia partially stabilized with yttria in a range from about 6 to about 8 percent by weight. In one aspect of the present invention, the yttria is doped with one of the rare earth-metal ions, such as Eu^{3+} present in europia (Eu_2O_3) to render it strongly luminescent in the visible wavelength range in response to an excitation by ultraviolet ("UV") radiation having a wavelength of about 253 nm. As used herein, UV radiation includes radiation having wavelengths from about 100 nm to about 400 nm. Other dopants; for examples, other rare-earth metals~~,~~ that respond to excitation energy other than UV may be used with yttria. For example, samarium doped in yttria may be excited at about 400 nm to emit in the visible range. Still other oxides may be advantageously used in place of yttria depending on the circumstances. In such cases, dopants may be chosen to provide emission in a desired wavelength range; for example, in a range that is most suitable for the chosen radiation detector. Another exemplary dopant is terbium which responds to exciting radiation having wavelength between about 280 nm and about 310 nm and emits with a strong peak at about 543 nm. Still another exemplary dopant is dysprosium which responds to exciting radiation having wavelength about 350 nm and emits with a strong peak at about 572 nm. Erbium is another suitable dopant that responds to exciting radiation having wavelength of about 380 nm and emits with a strong peak at 563 nm. Praseodymium is another suitable dopant that responds to UV exciting radiation having wavelength about 283 nm and emits a strong peak at wavelength about 630 nm. Other rare-earth metal dopants that also may be used are gadolinium, holmium, and thullium. --

Please replace the abstract with the following rewritten abstract:

-- ~~A method~~ An apparatus for determining past-service conditions and/or remaining useful life of a component of a combustion engine and/or a thermal barrier coating ("TBC") of the component comprises ~~providing a photoluminescent ("PL") material in the TBC, directing an exciting radiation at the TBC, measuring the intensity of a characteristic peak in the emission spectrum of the PL material, and correlating the intensity of the characteristic peak or another quantity derived therefrom to an amount of a new phase that has been~~

~~formed as a result of the exposure of the component to extreme temperatures. An apparatus for carrying out the method comprises~~ a radiation source that provides the exciting radiation to the TBC to excite a photoluminescent ("PL") material contained therein, a radiation detector for detecting radiation emitted by the PL material, and means for relating a characteristic of ~~the~~ an emission spectrum of the PL material to the amount of ~~the new~~ a crystalline phase in the TBC, thereby inferring the past-service conditions or the remaining useful life of the component or the TBC. --